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10/034,807	12/28/2001	Lisa Stadtmueller	00-1292-A	1489

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EXAMINER
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WYROZEBSKI LEE, KATARZYNA I

ART UNIT	PAPER NUMBER
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1714

DATE MAILED: 09/30/2003

Please find below and/or attached an Office communication concerning this application or proceeding.



<b>Office Action Summary</b>	Application No. 10/034,807	Applicant(s) STADTMUELLER, LISA	
	Examiner Katarzyna Wyrozewski Lee	Art Unit 1714	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-26 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-26 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
     If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

### Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
     a) ☐ All    b) ☐ Some \*    c) ☐ None of:  
         1. ☐ Certified copies of the priority documents have been received.  
         2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.  
         3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
     \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
     a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                     | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). ____   |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                            | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>0502</u> . | 6) <input type="checkbox"/> Other: _____                                    |



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It is noted that the independent claims 1 and 2 contain a recitation of the intended use. In such event, the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In a claim drawn to a process of making, the intended use must result in a manipulative difference as compared to the prior art. See *In re Casey*, 152 USPQ 235 (CCPA 1967) and *In re Otto*, 136 USPQ 458, 459 (CCPA 1963).

### ***Claim Objections***

1. Claim 19 is objected to because of the following informalities: Methacryloxy silane is not bi functional compound. For more prompt prosecution of the application, the examiner will treat this compound as having methacryloxy functionality and at least another functional group, wherein total amount of substituents on the silane is 4. Appropriate correction is required.



***Claim Rejections - 35 USC § 102***

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

3. Claims 1-13, 15-21 are rejected under 35 U.S.C. 102(b) as being anticipated by MOORMAN (US 5,319,014).

The prior art of MOORMAN discloses composition comprising polymeric component, filler and clay.

According to the example 1 of the prior art of MOORMAN, the composition is formed by mixing together following components: methyl methacrylate monomer, copolymer of methyl methacrylate, polymerization initiator, silane, alumina and organophilic clay (col. 6).



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By organophilic clay, MOORMAN means smectite clay, which in the particular example is bentonite that is cationically exchanged with primary or tertiary quaternary ammonium compound (col. 4, lines 39-68). The specification further lists hectorite as clay that can be used. Quaternary ammonium compound listed in MOORMAN includes alkyl chains having at least 12 carbon atoms such as stearyl groups (col. 5, lines 1-10). Although the prior art of MOORMAN did not get into details of chemistry behind cation exchange, he does state that the clay is in form of a plate-like material (line 7). The process of modifying clays with quaternary ammonium surfactants has already been patented by many and several disclosures are submitted for the applicant as a reference. Clay is mixed with ammonium compound in a solvent, that swells the clay and allows intercalation of ammonium compounds in between the clay platelets and they under appropriate conditions the two will undergo the cation exchange thereby increasing basal spacing between the clay platelets.

The basal spacing between clay platelets is inherently, on average, about 12 angstrom (please see attached printout). When intercalated with ammonium compound, the basal spacing increases to even higher numbers all of which will fit in the range claimed by the present invention. Exfoliation will further completely delaminate clay platelets.

Silanes utilized in the prior art of MOORMAN are those silanes, which have at least two functional reactive groups such as alkoxides (col. 5, lines 23-60). Particular example 1 discloses methacryloxy trimethoxy silane. Specification further discloses other silanes having at least two different functionalities.

The filler as disclosed in MOORMAN besides the alumina in the example 1 the disclosure of the prior art teaches silica (example 7), quartz (col. 3, lines 35-45) and various



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silicates. MOORMAN discloses that the fillers can be in form of a fiber that is cylindrical or rod-like (col. 3, lines 56-57) in order to provide composition with crack resistance (col. 1, lines 52-53). Other additives may include also dyes or pigments (col. 5, lines 62-65).

The polymeric component is as shown in an example 1, a mixture of monomer and copolymer of methyl methacrylates. The monomer is in a liquid form (col. 2, lines 10-15, 30-48) while the polymer is solid. Again the prior art of MOORMAN does not get into details of exfoliation, but again, the disclosures submitted with this application will provide the applicant with necessary showing of allegations presented here by the examiner. Polymerization of the monomeric component with polymer and crosslinking will inherently exfoliate the clay into single platelets.

In the light of the above disclosure, the prior art of MOORMAN anticipates the requirement of claims rejected above.

4. Claims 1-9, 12, 13, 17-21 are rejected under 35 U.S.C. 102(e) as being anticipated by LAN (US 6,262,162).

The prior art of LAN discloses composition for a nanocomposite comprising polymer and exfoliated clay.

Examples 7-9 discloses making of nanocomposite with matrix polymers. The polymers for the three examples are polyamide 6, PMMA and polyamide MXD6 (col. 24). The polymers are incorporated into the onium ion exchanged clay and melt extruded to form nanocomposite. The resulting basal spacing increased from 16-19 angstroms to 32-34 angstroms.



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Example 2 discloses method of modifying the clay with ammonium compound. The clay is dispersed in aqueous solution and mixed with ammonium compound. Upon mixing, the basal spacing of pure clay increased to 17 angstroms, which signified intercalation.

The clay component utilized in the examples is usually montmorillonite. The specification however, discloses other smectite type clays such as nontronite, saponite, hectorite, stevensite and the like. Other minerals include vermiculite and mica (col. 14, lines 5-30).

Besides polymers utilized in the examples 7-9, the specification of LAN teaches that the matrix polymer can also be polyurethane (col. 16, lines 53-68), polyesters, rubbers, polyolefins, polyvinyls, epoxides and the like (col. 17, line 1 – col. 18, line 10).

In the light of the above disclosure, the prior art of LAN anticipates the requirements of claims rejected above.

### ***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.



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6. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

7. Claims 22-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over MOORMAN (US 5,319,014) in view of GAUZAUSKAS (US 6,433,037).

The discussion of the disclosure of MOORMAN from paragraphs 2 of this office action is incorporated here by reference.

The difference between the present invention and the disclosure of the prior art of MOORMAN or LAN is recitation and use of methacrylic compositions in dental applications as well as their curing processes.

With respect to the above differences, the prior art of GAUZAUSKAS discloses highly filler composition comprising fibers, additives and acrylic polymers, wherein polymer component comprises liquid monomer and polymer and wherein the composition is utilized in dentistry.

The prior art of GAUZAUSKAS discloses that the polymer composition disclosed can be cured chemically, with light or with heat as well as dual cure, which includes first irradiating the composition with light and then heating it (col. 2, lines 14-18).



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Fiber reinforcement is provided in composition for dental application in order to improve crack resistance (col. 2, lines 64-66). According to the prior art of GAUZAUSKAS include quartz fibers, silica fibers, ceramic fibers and the like (col. 6, lines 28-32).

Non-fibrous fillers include various forms of clay, mica, alumina, silica and the like (col. 6, lines 45-64). Additives include coupling agents, antifoaming agents, dyes, pigments, initiators and the like (col. 6, line 65 and col. 6, lines 15-30).

The composition is utilized in making dentures, inlays, bridges, orthodontic devices, orthopedic devices (casts, splints) and the like.

The composition of the prior art of GAUZAUSKAS comprising acrylic resin, fiber and filler such as clay has excellent crack resistance.

In the light of the above argument, it would have been obvious to one having ordinary skill in the art at the time of the present invention that the composition of MOORMAN that results in porcelain looking articles comprising acrylic resin, fiber and clay and having excellent crack resistance can be utilized in dental applications of GAUZAUSKAS that requires the same components and properties.

8. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over MOORMAN (US 5,319,014) in view of KAWASUMI (US 4,810,734)

The discussion of the disclosure of MOORMAN from paragraphs 2 of this office action is incorporated here by reference.



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The difference between the present invention and the disclosure of the prior art of MOORNAN is more specific recitation of the ammonium compounds that can be utilized to modify clay.

With respect to the above difference, the prior art of KAWASUMI discloses method for making nanocomposite by polymerizing vinyl monomers such as acrylates *in situ* in presence of organophilic clay.

The clay of KAWASUMI is modified with compound such as 12-aminododecanoic acid in order to increase the basal spacing between the clay platelets (col. 3, line 59).

Using any type of intercalating or swelling agents as long as it is capable of undergoing cation exchange with cations present naturally in clay will result in increase of basal spacing between the clay platelets and thereby intercalation of organic agents between the platelets of the clay.

In the light of the above disclosure it would have been obvious to one having ordinary skill in the art at the time of the instant invention to utilize the swelling agent of KAWASUMI in the composition of MOORMAN and still arrive at organically modified clay.

9. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over MOORMAN (US 5,319,014) in view of BRAGODIA (US 6,586,500).

The discussion of the disclosure of MOORMAN from paragraphs 2 of this office action is incorporated here by reference.



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The difference between the present invention and the disclosure of the prior art of MOORNAN is more specific recitation of the ammonium compounds that can be utilized to modify clay.

With respect to the above difference, the prior art of BRAGODIA discloses method for making nanocomposite by melt mixing polymers such as acrylates with organophilic clay.

The clay of BRAGODIA is modified with compound such as bis(hydroxyethyl) methyl tallow ammonium and bis(hydroxyethyl) methyl hydrogenated tallow ammonium in order to increase the basal spacing between the clay platelets (col. 11, lines 33-40 and example 2).

Using any type of intercalating or swelling agents as long as it is capable of undergoing cation exchange with cations present naturally in clay will result in increase of basal spacing between the clay platelets and thereby intercalation of organic agents between the platelets of the clay.

In the light of the above disclosure it would have been obvious to one having ordinary skill in the art at the time of the instant invention to utilize the swelling agent of BRAGODIA in the composition of MOORMAN and still arrive at organically modified clay.

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. As mentioned in paragraph 2, and in addition to prior art already applied against present claims, following disclosures provide further teaching of modifying clays, intercalation and exfoliation processes: US 6,596,803 to LAN, US 6,552,114 to TURNER, US 2002/0055580 to LORAH, 2003/0060555 to LORAH



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11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Katarzyna Wyrozebski Lee whose telephone number is (703) 306-5875. The examiner can normally be reached on Mon-Thurs 6:30 AM-4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vasu Jagannathan can be reached on (703) 306-2777. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

*Katarzyna Wyrozebski*

KIWL

September 25, 2003